4 The on farm use of agro-chemicals and associated soil management and farming practices in St. Lucia and Jamaica

This is the fourth of six information sheets on improving agro-chemical management in the Caribbean. This sheet describes current farming practices and soil conservation activities and makes a number of recommendations.

1. Farming practices

In medium and large farms, most crops are grown in monoculture, while in smaller holdings several crops are grown on the same piece of land to enable harvesting all year round. For the purpose of this analysis, farms are defined and classified into three sizes: small (<10ha); medium (>10<200ha); and large (>200ha, the estate or plantation system). The greater majority of farms across the Caribbean are in the small category.

In St. Lucia, there has been a decline in the number of medium and large farms and a corresponding increase in the number of smallholdings since the 1960s. At the same time there has been an increase in the number of permanent crops, indicating more intensive land-use. Large farms mostly produce bananas with some tree crops (coconut, avocado, mango) whilst small farms are more varied, with bananas, tree crops, root crops, and vegetables. By land area, bananas are the single most important crop in St. Lucia.

In Jamaica, large farms utilise 38% of farmland but represent only 0.1% of registered holdings, whilst 90% of registered holdings relate to small farms and utilise 42% of farmland. The activities on both large and small farms will therefore be important to the management of agro-chemical use. 32% of land is under permanent crops, with sugar cane covering the largest area, followed by bananas. Small farms grow, in order of importance: banana, sugar cane, coffee, plantain, and cocoa, whilst large farms grow sugar cane, orange, coconut, banana, and pimento.

In both islands, a large part of the land under cultivation is on hillsides, and Jamaica has a higher proportion of its farms on steep slopes. Soil conservation techniques are used, albeit infrequently, in both Jamaica and St. Lucia and these techniques fall into two broad categories: engineering structures (i.e. building of terraces, stone barriers and walls, etc.); and vegetative barriers or farming practices (i.e. protecting soil through soil and vegetative management using contour or vegetable hedges, grass barriers, mulching, or other practices). In some of the farms in Jamaica and St. Lucia and also around the Caribbean, it has been found that proper soil erosion control can be achieved through the integration of selected engineering and biological or cultural control measures.

There has been overwhelming support for integrating soil conservation with other farming practices, rather than treating it in isolation. There is also recognition of the need to involve farmers in the selection and modification of the various soil and water management techniques.

It is also important to mention that increased population density in certain areas of the islands may increase or affect soil erosion and landslides. In Jamaica, many of the watersheds are degrading due to the high numbers of people living in close proximity to some of these already vulnerable areas.

International agreements (including WTO, CARICOM, CBI, FAO PIC, and Cotonou) regulate trade among Caribbean nations and with other countries, and influence agricultural land practices. These agreements also determine agro-chemical use, and thus potentially affect environmental pollution.

2. Farmer survey

For the purpose of this survey, farm size classification was defined in two categories, namely small farms (<5ha) and large farms (>5ha). In Jamaica, 149 farms were surveyed, of which 57 were classified as large. In St. Lucia, 150 farms were surveyed, of which 23 were large. In both islands, over 60% of the farms were owned by the farmer, or his or her family. The main crops varied between the two islands, with banana, citrus, cocoa, coconut, coffee, sugar cane, and yam being prevalent in Jamaica, while in St. Lucia there were banana, cocoa, mixed vegetables (cabbage, hot pepper, and tomatoes), and root crops (dasheen, sweet potato, and yam). In both islands, the majority of farmers were over 40 years old: this was more prevalent in Jamaica. In addition, most of the farmers only had a primary level of education.

Soil water management on the farms differed between the two islands, mainly because of differing rainfall levels. In Jamaica, with

relatively low rainfall and relatively light soils, lack of water was a serious constraint and a variety of methods to increase the irrigation of crops were used. Despite this, only 40% of the farms practised mulching. In St. Lucia, rainfall is higher and soils were reported, on average, to be heavier than those in Jamaica. The problems in St. Lucia were related more to excess soil water and drainage.

Soil erosion appears to be more of a problem in Jamaica, mainly because of the greater proportion of steep slopes being farmed. The survey showed that many farmers observed signs of erosion. In St. Lucia, more than half of the farms surveyed were on moderate to gentle slopes, and this lessened the erosion risk, but higher rainfall increased drainage problems. The higher rainfall in St. Lucia is also likely cause greater erosion on steeper slopes. Erosion control methods were poor in both islands: in St. Lucia, there was no mention of hedgerows as a means of erosion control; and, in both islands, tree planting could be used to enhance soil conservation.

The survey showed widespread use of fertilisers and pesticides in both islands. Chemical fertilisers were used on most farms, although very few had done soil chemical analyses. This was more pronounced in Jamaica than in St. Lucia. Pest and disease control was done almost entirely through chemical applications in both islands. Farmers indicated that the use of agro-chemicals increased their yields and improved the appearance of their produce. The control of weeds, however, was done mainly by mechanical means. In both islands, the majority of farmers indicated that they would use more agro-chemicals if they had the resources. Results show that many of the farmers in both St. Lucia and Jamaica were unaware of the environmental impacts of using agro-chemicals on their farms.

Farmers also indicated that most of their excess chemicals were stored for future use, applied to the soil, or buried. They disposed of containers by burning, and most used some sort of protective clothing while spraying. The interval between spraying pesticides and harvesting of crops was 1–2 weeks in both islands, but, surprisingly, a small number of farmers in St. Lucia indicated that this interval could be less than one day. The farmers in both islands were mostly unaware of incidents in which human health had been affected by chemical spraying, although available hospital data from Jamaica indicated there had been several incidents involving mainly children under the age of five (PCA, Chin Sue).

3. Recommendations

- Soil conservation and water management practices are essential to reduce run-off from agro-chemical applications that will cause the pollution of water bodies.
- Soil testing on farms should be increased to ensure that chemical fertilisers are correctly applied to overcome deficiencies in the soil and to avoid excessive use of fertilisers.
- Training, communication, and education of farmers are vital.
- Good Agricultural Practices (GAP) and Integrated Pest Management (IPM) must be promoted to improve agro-chemical use and highlight alternative solutions.
- Awareness must be raised of the benefits of GAPs (for human and environmental health) and farmer training in GAPs should be provided.
- Integrated Pest Management (IPM) systems that reduce pesticide use on crops and promote pest control by non-chemical methods should be introduced into the farming communities and recommended in both islands.
- More research on IPM (Integrated Pest Management) and IMPP (Integrated Management of Pests and Pesticides) should be conducted as a means of improved management of the use of pesticides.
- A comprehensive, well-developed IMPP programme should be designed and implemented, including cost-benefit analyses. This programme should be at national and regional levels and incorporate biological controls and prudent vegetative/ farming practices. The IMPP programmes should be designed by stakeholders, including pest operators, local and regional agro-chemical importers and manufacturers, farmers, environmental groups, state bodies, the public, and the relevant university departments.
- Socio-economic analyses, including cost-benefit analyses, should be conducted for different farming practices, including options for agro-chemical use (e.g. IPM).
- Pesticide management procedures must be brought to the attention of the farming community, and especially to children living in these farming communities, as

many agro-chemicals are stored in the home.

- Promotion of agriculture in schools to increase youth, particularly female, participation in the sector, must be pursued.
- Communications experts should be engaged for communication, education, and training purposes; change-management concepts should be applied (e.g. to influence changes in agricultural practice, storage, labelling, sale, and disposal of agro-chemicals).
- Training courses on environmental protection and the effect of excessive use of agro-chemicals on the environment should be initiated in both islands. Further training on the environmental impacts of certain farming practices (i.e. in terms of erosion) should also be encouraged.
- The practice of mulching should be encouraged, particularly in drier areas of Jamaica, as a means of soil and water conservation, though farmers in high rainfall areas claim that slugs are a problem when they use mulch.
- The use of vegetative barriers with a potential to generate income (e.g. pineapple barriers for soil erosion control) should be introduced into St. Lucia and further encouraged in Jamaica.
- Compost making and the use of organic manure should be promoted on all farms.

Further information

Available as downloadable files under the Land-Water Interface option in the left-hand panel at http://www.mragltd.com.

- Pesticide Control Authority. H. Chin-Sue, pers. comm.
- Simpson, L., 2003. Review of soil management and farming practices, including the use of agro-chemicals in the Caribbean, with particular reference to St. Lucia and Jamaica. Research project DFID NRSP R7668. April 2003. CARDI, Jamaica.

Research focused on two watersheds (Rio Cobre and Wag Water) in Jamaica and three watersheds (Soufriere, Pointe and Praslin, and Rousseau) in St. Lucia.

Other information sheets in the series are:

1. Management of agro-chemicals for improved public and environmental health
2. The fate of agro-chemicals in the land-water interface in St. Lucia and Jamaica: Environmental monitoring
3. The quantification and toxicity of agro-chemical imports into St. Lucia and Jamaica
5. Harmonisation of agro-chemical management in the Caribbean
6. Management options for the use of agro-chemicals.

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